MULTI-RANGE PARALLEL-HYBRID CONTINUOUSLY VARIABLE TRANSMISSION

Abstract

A parallel-hybrid transmission has one or more electrical motor/generator units, at least one of which moves in an anti-engine-wise direction in certain operational modes. The motor/generators are coaxially or concentrically arranged with the transmission input and output shafts via planetary gear sets. Associated clutch closures selectively couple power to and from the sun gears and planetary carriers of the gear sets through a complex planetary gear configuration such as a Ravigneaux gear set, for switching between certain operational modes. The clutch and brake operations selectively achieve multiple ratio range operations including engine starting under electric power, high torque acceleration from a standstill, regenerative deceleration (braking), multiple ratio range operation, load sharing, rotation-matched step-less shifting and combined or individual continuously variable combustion engine and electric motor and/or generation modes.